Project Introduction

Embry-Riddle Aeronautical University (ERAU) and Honeybee Robotics (HBR) proposes to develop an integrated autonomous free-flyer robotic spacecraft system to support the exploration and subsequent resource utilization of asteroids as well as other planetary bodies and moons. The proposed spacecraft will address the first step towards In Situ Resource Utilization from Near Earth Object bodies; namely it will prospect it with sample acquisition devices and characterize the NEO for ISRU potential. Embry-Riddle and Honeybee Robotics propose an innovative resource prospecting mission concept based on autonomous small marsupial free-flyer prospector spacecrafts. Such technologies are currently being developed at Embry-Riddle. The spacecraft will utilize unique technologies such as MicroDrills and Pneumatic Samplers previously developed under other SBIR projects by Honeybee Robotics. In particular, the proposal will focus on flight control and reconfiguration for guidance under extreme environments, vision-aided navigation approaches, and sampling systems design, testing and evaluation. The proposed system will be developed, simulated and evaluated during Phase I of the project, and experimentally validated and demonstrated during Phase II through flight testing on an autonomous research platform. The successful completion of the proposed research is anticipated to provide a theoretical and experimental framework to investigate the capabilities of a marsupial-based robotic system to explore and extract samples from terrains that would be inaccessible to traditional rover-type vehicles and where traditional flight guidance and navigation sensors, such as GPS receivers and magnetometers, are not functional.

Primary U.S. Work Locations and Key Partners

Free-Flying Unmanned Robotic Spacecraft for Asteroid Resource Prospecting and Characterization Project Image

Table of Contents

Organizations Performing Work	Role	Type	Location
Honeybee Robotics, Ltd.	Lead Organization	Industry	Pasadena, California
Embry-Riddle Aeronautical University-Daytona Beach	Supporting Organization	Academia	Daytona Beach, Florida
🟢Kennedy Space Center(KSC)	Supporting Organization	NASA Center	Kennedy Space Center, Florida

Primary U.S. Work Locations	
Florida	New York

Project Transitions

▶ **June 2014:** Project Start

✅ **December 2014:** Closed out

> **Closeout Documentation:**
> - Final Summary Chart*(https://techport.nasa.gov/file/140633)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Honeybee Robotics, Ltd.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

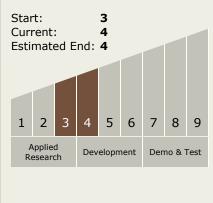## Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:
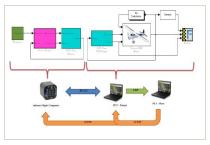
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Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**

1	2	3	4	5	6	7	8	9
Applied Research			Development			Demo & Test		

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For more information and an accessible alternative, please visit:
https://techport.nasa.gov/view/18188

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Images

Project Image
Free-Flying Unmanned Robotic Spacecraft for Asteroid Resource Prospecting and Characterization Project Image
(https://techport.nasa.gov/image/127904)

Technology Areas

Primary:

- TX04 Robotic Systems
  └ TX04.3 Manipulation
     └ TX04.3.2 Grappling Technologies

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System